Vehicle Technology and Trends 2013

Module 5

I-CAR®

Class 0:21

A-1

MODULE 5–CONTINUING TRENDS AND POSSIBILITIES

Topic A. Continuing Trends

Learning Objectives

The learning objectives for this module include identifying:

- **vehicle manufacturing trends that are continuing.**
- **innovations that may become trends in future model**

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Notes

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Topic A. Continuing Trends (cont'd)

A-2

Search For Lightweight Materials

CAR
CENTER FOR AUTOMOTIVE RESEARCH

Reducing vehicle mass is one of the keys necessary to achieve the CAFÉ standard of 54.5 mpg by 2025. The options for lightweight materials are still too small, so the search for more options is underway. To that end, a coalition has been formed, and effort headed up by the Center for Automotive Research (CAR). The Coalition of Automotive Lightweighting Materials (CALM):

- combines the aluminum and plastics industries working with vehicle makers.
- involves more than 200 companies, including 3M, BASF, Michelin, PPG Industries, Plastic Omnium, Altair, EWI, Material Sciences Corp., Trexel, Shiloh Industries, and more.

Notes

More information on CALM can be found at the Center for Automotive Research website (www.cargroup.org) or by searching for Coalition of Automotive Lightweighting Materials.

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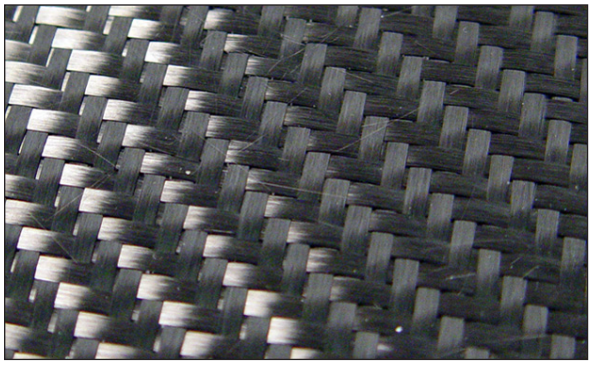
Topic A. Continuing Trends (cont'd)

A-3

Welcoming Carbon Fiber



One material getting a lot of attention is carbon fiber, so far limited to high-end vehicles and aftermarket accessories due to its high cost. Carbon fiber is:

- among the strongest, yet lightest, material available for vehicle bodies.
- being studied for how it could be produced in high volumes, thus reducing the cost.
- getting a lot of attention from Ford, which is teaming with Dow Automotive Systems to research the use of advanced carbon fiber composites. If the effort is successful, Ford is eyeing wide use in high-volume vehicles by the end of the decade. Dow has already partnered with Turkish carbon fiber maker AKSA and the U.S. Department of Energy Oak Ridge National Laboratory.

GM in 2011 paired with Teijin Ltd. to develop advanced carbon fiber composites.

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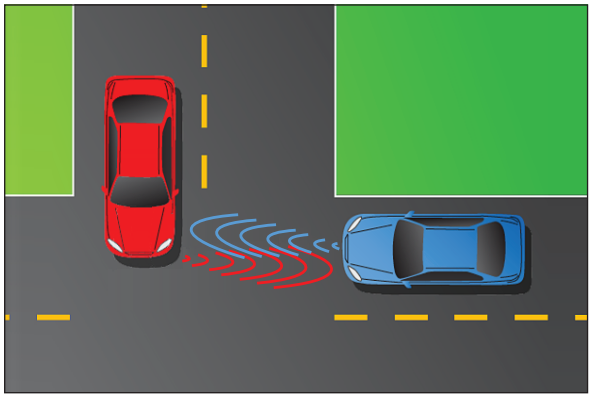
Topic A. Continuing Trends (cont'd)

A-4

Vehicles Talking With Each Other



Collision avoidance is still getting a lot of attention, especially from NHTSA, which sees vehicles talking with each other the next major safety breakthrough. This technology will:

- be done via a wireless network.
- communicate such factors as speed, location, direction, and location of traffic lights and work/school zones.
- only work if all vehicles are equipped.

This is not a new thought. The Federal Communications Commission in 1999 set aside part of the wireless spectrum for vehicle-to-vehicle communication. NHTSA began its study in 2002. In 2011, talks began with vehicle makers. NHTSA is considering mandating collision avoidance systems and that mandate would include vehicle-to-vehicle communication.

Notes

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Topic A. Continuing Trends (cont'd)

A-5

Autonomous Vehicles By Decade End

Courtesy of BMW

Autonomous vehicles, or vehicles that drive themselves, are closer to reality than many people realize. For example:

- GM is predicting there will be autonomous vehicles on the road by the end of the decade. GM is now road-testing a technology called "Super Cruise" on the Cadillac XTS, which is adaptive cruise control combined with self-steering and GPS guidance. The system lights up the steering wheel with a row of green LEDs when the driver can let go of the steering wheel. It is only operational when using cruise control.
- BMW and Audi have a number of test vehicles in operation. Google is testing an autonomous Toyota Prius.
- Volvo has successfully tested a platoon of four riderless vehicles on public highways. The platoon followed a lead vehicle, maintaining a set distance behind.
- U.S. states are starting to authorize legislation allowing autonomous vehicles. Nevada, in 2011, became the first state to approve leg-

Notes

More information on the GM Super Cruise can be found at: www.autoblog.com/2012/04/30/watch-cadillacs-new-semi-autonomous-super-cruise-in-action.

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Topic A. Continuing Trends (cont'd)

islation authorizing licenses to be issued for self-driving vehicles. New Jersey introduced similar legislation in 2012. Other states, such as California and Florida, are considering it. All of the legislations require a person sitting in the driver's seat. The driver can be relaxed, but fully aware of what is going on, ready to take control of the vehicle when necessary.

- the technology to operate autonomous vehicles already exists. Vehicle makers are now competing to put it all together and introduce the first model.

Members of the Institute of Electrical and Electronics Engineers, a professional organization dedicated to advancing technology, have selected autonomous vehicles as the most viable form of intelligent transportation, anticipating that they will account for up to 75% of vehicles on the road by the year 2040.

Notes

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Topic A. Continuing Trends (cont'd)

A-6v

Video: Tech/Trends Trivia

Notes

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Topic A. Continuing Trends (cont'd)

A-7

Unplugged Hybrid Charging

Infiniti LE Concept

Instead of plugging in an electric vehicle for charging, it will soon be possible to just have to park the vehicle in a certain location for charging purposes. The unplugged hybrid charging technology:

- is done via an inductive pickup that would be located on the bottom of the vehicle.
- would automatically begin when a vehicle fitted with a charging coil is positioned over the charging coil in the ground.
- is getting serious looks by Mercedes-Benz, which has been doing test runs on the A-Class.
- is getting serious looks by Volvo, which has been experimenting.

The vehicle shown is a concept Infiniti LE. Infiniti says the concept represents an 85% accurate view of the production model, which should arrive in 2015. The inductive charging mat, which is designed to fit on a garage floor, is predicted to become the first such mat commercially available.

Notes

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Topic A. Continuing Trends (cont'd)

A-8

New Lithium Battery

Chevrolet Spark

An ongoing issue with lithium-ion batteries is the chance that they can catch fire after a severe collision. A proposed new type of lithium-iron-phospate battery:

- stores 10% less energy than lithium-ion technology.
- has a lower chance of catching fire after a severe collision.
- is already targeted for the electric version of the Chevrolet Spark.

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Topic A. Continuing Trends (cont'd)

A-9

Electric Highways Opening

Nissan Leaf

The issue with pure-electric vehicles, like the Nissan Leaf, is that there is a travel limit due to the need for recharging. So-called electric highways would have charging stations at regular intervals, and the first of these highways is already starting to open.

The first phase of the West Coast electric highway, I-5 in southern Oregon, is open. Eventually, the highway will extend into Canada.

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Topic A. Continuing Trends (cont'd)

A-10v

Video: Volvo "You" Concept

This video shows some features of the concept Volvo centered around the vehicle owner.

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Topic A. Continuing Trends (cont'd)

A-11

Future Of Drying

Imagine if a spraybooth could dry and cure refinishing material in less than three minutes. The Symach Robodry (SY-mak ROE-boe-dry) system:

- is being used in Europe and Australia today. The company is based in Italy.
- is scheduled to come to the U.S. in 2014.
- uses natural methane gas passing through catalysts and oxygen to create infrared energy. The concentrated infrared energy follows the profile of the vehicle along the sides, top, and bottom, maintaining an even distribution.
- can be programmed for several different types of coatings and body fillers.

Notes

More on this technology can be found at www.fenderbender.com. Do a search for "The Future of Paint Drying."

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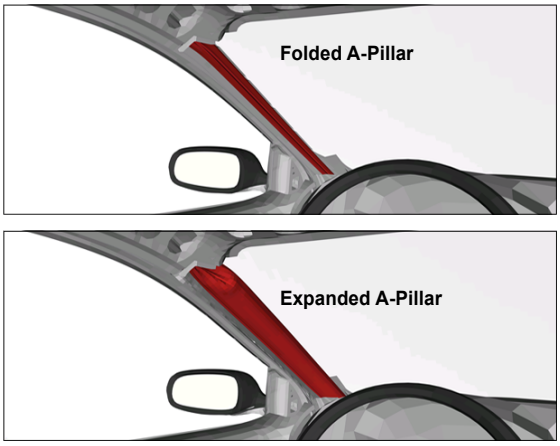
Topic A. Continuing Trends (cont'd)

A-12

Expandable Upper A-Pillar



Courtesy of Autoliv

To pass roof crush tests, it is essential to have strong A-pillars, but that can add weight and thickness. One proposed solution is an expandable A-pillar, which:

- in its relaxed state, is three-times thinner than normal. This provides a better view of the road and intersections, and also less weight.
- in a collision, deploys by expanding and increasing the stiffness by 45%. The steel pillar itself expands, not an airbag within the pillar.
- is proposed by a major airbag maker (Autoliv).

Notes

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Topic A. Continuing Trends (cont'd)

A-13

VW Electronic Sun Visor

Volkswagen engineers are coming close to solving the problem of a driver being blinded when they are driving into morning or evening sun. They call it an electronic sun visor, which:

- has sensors to look at the driver's eye position and the sunrays reaching the windshield, to sense where the sun is most blinding on the driver's eyes.
- has a computer to combine the sensor information and darken only that section, and change the darkened section as the vehicle goes around curves and turns.
- uses similar technology as electrochromatic glass, which darkens the entire glass with the push of a button.
- would require a special windshield. The technology would only be applied to the top area of the windshield, as there is an effect on glass clarity, but it is said to be much better than sun visors used today.

Notes

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Topic A. Continuing Trends (cont'd)

The technology is still in the developmental stage. The long-term objective is broad coverage, including side glass, and blocking the glare of oncoming headlamps.

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Topic A. Continuing Trends (cont'd)

A-14

Moving B-Pillar On European Ford B-MAX

Courtesy of Ford Motor Company

The Ford B-MAX, currently only in Europe, has moving B-pillars in the hinged front and sliding rear doors, which:

- are fitted with ultra-high strength steel brackets called "crash catchers" that lock the doors together if the vehicle is hit in the side.
- provide side-impact protection when the doors are closed and latched. More than 5,000 computer simulations and 140 physical side-impact crashes were done. Because of these successful crash tests, the vehicle could be heading for the U.S. market.

Notes

An article and photo on a crash test on the B-MAX B-pillar can be found at www.sae.org/mags/AEI/10996.

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Topic A. Continuing Trends (cont'd)

A-15v

Video: Tech/Trends Trivia

Notes

Use this last trivia question as a tie breaker, if necessary. The person who comes closest to the correct answer wins this one.

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Topic B. Future Possibilities

B-1

Terrafugia Transition Air Car

For those who cannot figure out whether to go by road or through the air, there is the Terrafugia (ter-ah-FEW-jee-ah) Transition, the first commercially available air car. The Transition:

- is a street-legal airplane. It can be driven on any road and parked in a standard parking space or household garage.
- rides on the highway like any other vehicle, and turns into a plane by unfolding the wings in about 40 seconds. In order to take to the air, it needs at least 2,500 feet of runway, which nearly all airports have. In the cockpit there is both a steering wheel for driving, and a control stick for flying. The folding wing mechanism is in its fourth generation of development.
- is still in the prototype stage, but the company is taking orders.
- has a carbon fiber "safety cage" around the occupants and a carbon fiber driveshaft that connects the engine to a power takeoff, which spins the propeller in the rear. When in the drive mode, the power takeoff disengages from the

Notes

More information on the Terrafugia Transition can be found at www.driventofly.com.

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Topic B. Future Possibilities (cont'd)

propeller and connects to a belt that drives a continuously variable transmission to turn the rear wheels. The propeller is locked in position.

- follows the necessary federal motor vehicle safety standards, including driver and passenger airbags, an energy-absorbing crumple zone made of aluminum, an independent front suspension, and a rearview camera. There is also a safety parachute that deploys from the rear of the hood, if necessary. Door mirrors retract when the vehicle is being used as an airplane.

Notes

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Topic B. Future Possibilities (cont'd)

B-2

Hydrogen Economy In 2015

Toyota FCV-R

The dream of a fuel cell vehicle that runs on hydrogen and exhausts only water is still alive. At least six companies are launching fuel cell vehicles (FCVs). Many have targeted 2015 for mass production. Evidence of these efforts include:

- GM, which coined the phrase "hydrogen economy," is still promoting the Chevrolet Equinox, a fuel cell SUV.
- Honda keeping alive the FCX Clarity, which is being leased by several customers, primarily in Southern California where there are the most hydrogen fueling stations.
- Hyundai, which has produced a Blue Will FCV, recently confirmed a goal of producing 10,000 fuel cell vehicles annually by 2015.
- Mercedes-Benz showcasing a fuel cell B-Class. It received the prestigious eCar Award in 2012.
- Toyota planning on a commercial rollout of a fuel cell vehicle in 2015. Toyota says it will look similar to the FCV-R that was on display at auto shows in 2012.

Notes

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Topic B. Future Possibilities (cont'd)

The primary hurdle for hydrogen-fueled vehicles is establishing an infrastructure of hydrogen fueling stations.

Notes

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Topic B. Future Possibilities (cont'd)

B-3

Toyota Mood Sensors

Similar to the popular "mood ring" of the mid-70s, Toyota engineers are working on a mood sensing electronic system that:

- determines the emotional state of the driver.
- customizes safety alert systems based on the sensor information.
- is based on a study that shows sad or angry drivers have delayed reaction times. So if the system senses that the driver is upset or angry, there will be more time allotted to give the driver more time to react. If the driver is sensed at being neutral, the standard alert times will apply.
- uses several sensors looking at the driver's face and the driver's position in the seat.

The technology is still years away from production.

Notes

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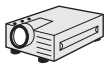
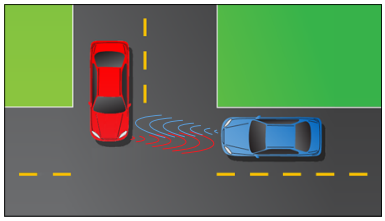
Topic C. Conclusion



C-1

Conclusion



Topics covered in this module included:

- continuing vehicle manufacturing trends.
- possible future trends.

Notes

Remind the students that the Program CD-ROM includes copies of the: video scripts.

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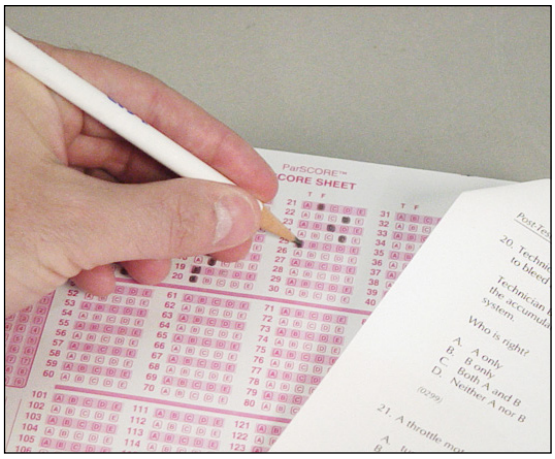
Topic C. Conclusion (cont'd)

C-2

Post-Test



Before beginning the post-test, the answer sheets need to be correctly filled out. Any missing information will delay the issuing of credit for this program. Have the students clearly fill in their:

- I-CAR ID number.
- phone number.
- name, leaving a space between the last and first name, and between their first name and middle initial.
- test form letter (A or B) under **TEST FORM**. The test form letter appears in the upper right corner of the Post-Test Question Booklet.

Notes

It is very important that the students properly fill out the answer sheet before starting the Post-Test.

When filling out the I-CAR ID Number portion of the Scantron answer sheet place two zeros (00) in front of the I-CAR ID Number or use a full SSN/SIN.

Contesting A Question
All questions contained in this Post-Test have been carefully developed and reviewed. If, however, a student feels that a question has multiple answers or is incorrect in any way, they still must answer it with what they feel is the best answer. They can then also darken the letter E on the form for that question and write their concern on the back of the form. This is only to alert staff of a student's concern and does not mean the student is not responsible for answering the question correctly.

This process is to be used in extreme situations where a student feels strongly that there is a problem with a question and brings it to the attention of the Instructor/Administrator, and should not be announced to the class.

Topic C. Conclusion (cont'd)

Notes

The students also need to clearly write in the:

- instructor's name on the line appearing after **INSTRUCTOR NAME**.
- Post-Test Question Booklet number on the line appearing after **PROGRAM TEST VERSION**. This number is located on the upper left corner of the question booklet after the word **PROGRAM TEST VERSION**.
- date of the class on the line appearing after **DATE**.

Direct the students to answer all questions in the question booklet using the appropriate area on the answer sheet. Use a pencil to darken the circle which represents the best answer to the question. There is only one correct answer for each question.

The answer sheet is electronically scanned, so questions will not be scored as correct if they are:

- answered with more than one answer.
- not clearly marked on the answer sheet.
- mistakenly marked and not completely erased.
- completed in ink.

At the completion of the Post-Test, students are to hand in both the completed answer sheet and the question booklet. Students are not allowed to keep the question booklets. It is the Post-Test administrator's responsibility to make sure that all test booklets are returned to I-CAR with the answer sheets. Post-Test questions are changed often and printed "on demand," so there is no advantage to keeping the question booklets.

Topic C. Conclusion (cont'd)

Place the Post-Test and the completed answer sheets in the provided envelope and mail them to I-CAR for scoring. Students will be informed of their test results upon scoring of the tests and processing by I-CAR.

Notes